LAB 1– Creating Web Services in NetBeans

Service Oriented Architectures

Practical Exercises

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Outline

Web Services Overview

Creation of a Web Services Server

Creation of different Web Services clients

- Java
- Servlet
- JSP

Web Services Overview - 1

Goals

- Enable universal interoperability
- Widespread adoption
- Enable (Internet scale) dynamic binding
  - Support a service oriented architecture (SOA)
- Efficiently support both open (Web) and more constrained environments

Requirements

- Based on standards
- Minimal amount of required infrastructure is assumed
  - Only a minimal set of standards must be implemented
- Very low level of application integration is expected
- Focuses on messages and documents, not on APIs

Web Services Overview - 2

Framework can be described in terms of

- *What is transmitted*:
  Formats and protocols → SOAP

- *What describes what is transmitted:*
  Description languages → WSDL

- *What allows us to find these descriptions:*
  Discovery of services → UDDI

SOAP

Simple Object Access Protocol

SOAP 1.1 defined:

- An XML envelope for XML messaging
  - Headers + body
- An HTTP binding for SOAP messaging
  - SOAP is “transport independent”
- A convention for doing RPC
- An XML serialization format for structured data

SOAP Attachments adds

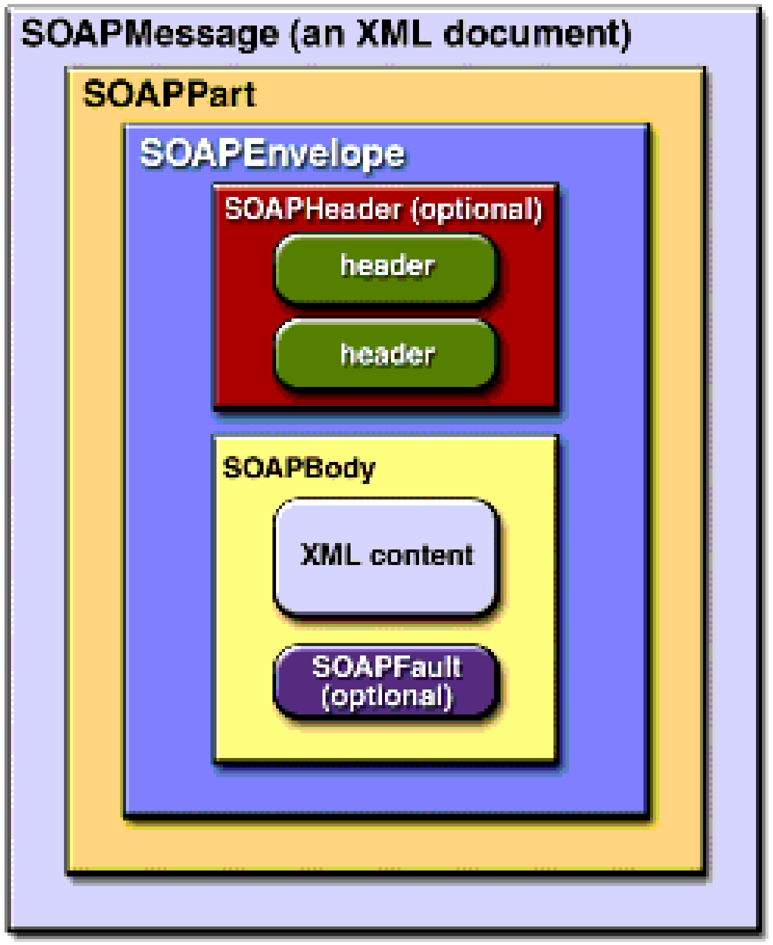
- How to carry and reference data attachments using in a MIME envelope and a SOAP envelope

SOAP Messagge

```
<SOAP-ENV:Envelope
   xmlns=
    "http://schemas.xmlsoap.org
              /soap/envelope/">

     < SOAP-ENV:Header>
       ...
     </ SOAP-ENV:Header>

     < SOAP-ENV:Body>
        ...
     </ SOAP-ENV:Body>
    ...
</ SOAP-ENV: Envelope>
```



WSDL

Web Service Description Language

Provides functional description of network services:

- IDL description
- Protocol and deployment details
- Platform independent description
- Extensible language

A short history:

- WSDL v1.0, 9/2000
- WSDL v1.1 submitted to W3C 3/2001
- A *de facto* industry standard

WSDL Structure

portType

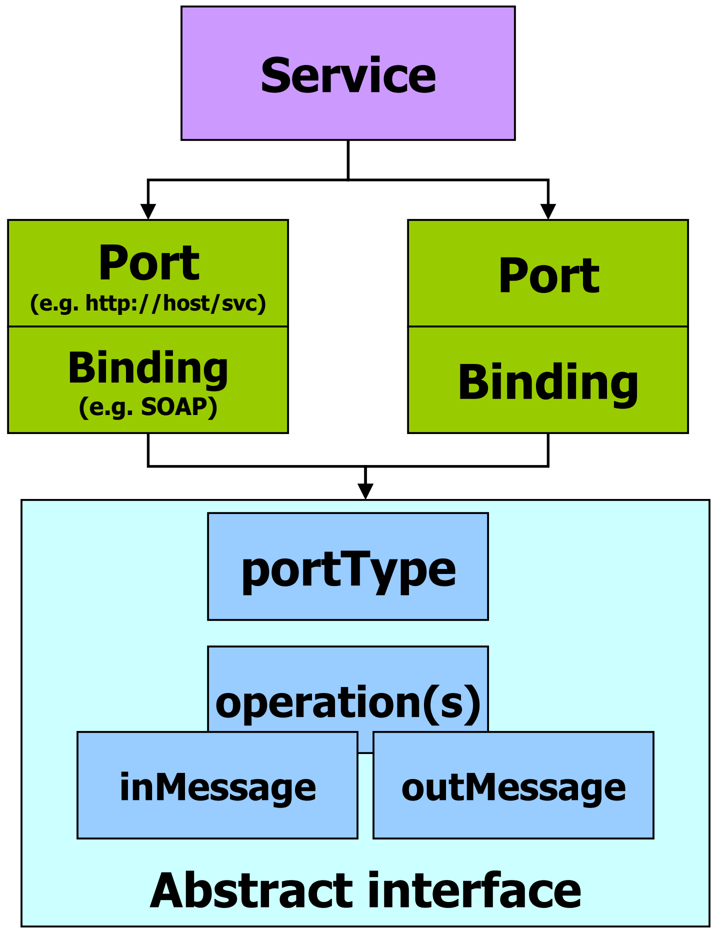
- Abstract definition of a service (set of operations)

Multiple bindings per portType:

- How to access it
- SOAP, JMS, direct call

Ports

- Where to access it



WSDL Uses

As extended IDL: WSDL allows tools to generate compatible client and server stubs

- Tool support for top-down, and bottom-up development

Allows industries to define standardized service interfaces

Allows advertisement of service descriptions, enables dynamic discovery and binding of compatible services

- Used in conjunction with UDDI registry

Provides a normalized description of heterogeneous applications

Web Services Tutorial

Implemented in NetBeans 6.1

Steps are similar for common IDEs (e.g. Eclipse)

A Simple Exercise: Flight Booking

The AX airlines provides a simple Web Services for flight booking

The Web Service provides two operations:

- *getAvailability*: gets in input number of requested seats, origin, destination, and returns a confirmation string
- *bookFlight*: gets in input name, number of seats, origin, destination, and return a string as flight receipt

Creation of a Web Services Server

Creation of a new Web Application

Creation of a new Web Service

- Operations definition (*getAvailability* and *bookFlight)*
- Define parameters (name, seats, source, destination)
- Implementation of business code
- Generation of WSDL

Test Web Service!

Creation WS Client - Java

Creation of a Java Application

Creation of a WS Client

- Import external WSDL
- Insert business code

Test Java Application!

Creation WS Client - Servlet

Creation of a Web Application

Creation of Servlet code

- Import external WSDL in a WS Client
- Insert business and presentation code

Test Servlet!

Creation WS Client - JSP

Creation of a Web Application

Creation of a WS Client

- Import external WSDL in a WS Client
- Insert presentation code in JSP file
- Test JSP page

Exercise

Create a new Web Service AF

The Web Service provides two operations:

- *getAvailability*: gets in input number of requested seats, origin, destination, and returns a confirmation string
- *bookFlight*: gets in input name, number of seats, origin, destination, and return a string as flight receipt

Exercise

Create a new Web Service First Hotel

The Web Service provides two operations:

- *getPrice*: gets in input number of guests and city, and returns a confirmation string
- *bookRoom*: gets in input name, number of guests and city, and return a string as hotel voucher